UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMEN

Form Approved
OMB No 0704-0188

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b RESTRICTIVE MARKINGS None
2a SECURITY CLASSIFICATION AUTHORITY N/A	3 DISTRIBUTION/AVAILABILITY OF REPORT Distribution Statement A. Approved for public release; distribution is unlimited.
2b DECLASSIFICATION/DOWNGRADING SCHEDULE N/A	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) DOD POP HM TR/AYD 94-031	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a NAME OF PERFORMING ORGANIZATION Packaging Division	6b OFFICE SYMBOL (If applicable) SMCAR-AEP
6c ADDRESS (City, State, and ZIP Code) US Army ARDEC Picatinny Arsenal, NJ 07806-5000	7a NAME OF MONITORING ORGANIZATION 7b ADDRESS (City, State, and ZIP Code)
8a NAME OF FUNDING/SPONSORING ORGANIZATION	8b OFFICE SYMBOL (If applicable)
8c ADDRESS (City, State, and ZIP Code)	9 PROCUREMENT

10 SOURCE OF FUNDING NUMBERS			
PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

11 TITLE (Include Security Classification)
Performance-Oriented Packaging (POP) Testing of Refurbishment Kit for M880 Short Range Practice Cartridge for 81mm Mortar Packaged in a Wood Wirebound Box per drawing 12944155.(U)

12 PERSONAL AUTHOR(S)
Yuen H. Lam, Packaging Engineer

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Final	FROM _____ TO _____	94-09-22	4

16 SUPPLEMENTARY NOTATION
This report supersedes the previously released POP test report #DOD POP HM TR/AYD 93-015.

17 COSATI CODES		
FIELD	GROUP	SUB-GROUP

18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Performance-Oriented Packaging (POP) Cartridge, M880 81mm Mortar 12944155 Short Range Practice

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This report contains test results conducted on the Refurbishment Kits for M880 Short Range Practice Cartridge for 81mm Mortar packaged in a wood wirebound box per drawing 12944155. The tests were conducted in accordance with the requirements of CFR 49. The packaging is submitted for Performance-Oriented Packaging certification.

94 [illegible] 21

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	UNCLASSIFIED
22a NAME OF RESPONSIBLE INDIVIDUAL Yuen H. Lam	22b TELEPHONE (Include Area Code) (201)724-2228
	22c OFFICE SYMBOL SMCAR-AEP

DD Form 1473, JUN 86 *Previous editions are obsolete.*

Statement A, unlimited

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

I. Report Number: DOD POP HM TR/AYD 94-031

II. Title: Performance-Oriented Packaging (POP) testing of Refurbishment Kit for M880 Short Range (SR) Practice Cartridge for 81mm Mortar Packed in a Wood Wirebound Box

Packaging drawing Number: 12944155

Author: Yuen H. Lam

Performing Activity: U.S. Army Armament Research, Development and Engineering Center (ARDEC)

Address: Department of the Army
Commander, U.S. Army ARDEC
ATTN: SMCAR-AEP, Bldg. 455
Picatinny Arsenal, N.J. 07806-5000

Date: September 1994

1. Data:

Container:

Type: Box, Wirebound
UN Code: 4C1
Specification: MIL-B-46506
Drawing Number: 12944155
Material: Wood
Maximum net mass: 45 kg (99 lbs)
Dimensions: 101.9 cm X 51.0 cm X 36.2 cm
(40 1/8 in X 20 1/16 in X 14 1/4 in)
Gross Weight: 54.5 kg (120 lbs)

Product:

Name: Refurbishment Kit for Cartridge 81mm: Practice, SR, M880
Drawing Number: 12944145
Cage Code: 19200
United Nations Proper Shipping Name: Articles, Pyrotechnic
United Nations Identification Number: 0431
Hazard Classification: 1.4G
United Nations Packaging Group: II
Physical State: Solid
Number of Refurbishment Kits per Container: 100
National Stock Number (NSN): 1315-01-219-3936
DOD Identification Code: C045

2. Reference Material:

a. Federal Register, "49 CFR Part 107-179"

b. United Nations, "Transport of Dangerous Goods"

3. Background:

This report details Performance-Oriented Packaging (POP) tests conducted on the Refurbishment Kits for M880 SR Practice Cartridge for 81mm mortar packed in a wood wirebound box in accordance with drawing 12944155. Each (set of) refurbishment kit weighs approximately 0.55 lb. A package contains 100 refurbishment kits. The POP tests were conducted using packages containing additional weights to insure container integrity. The weight of the packed out tested container was 139 lbs (63 kg). Tests were performed according

to POP test regulations.

4. Test:

The following POP tests were performed at ambient temperature:

a. Vibration Test (178.608)

Procedure:

Two wirebound boxes were vibrated on a vibrating platform unrestrained for a one and half hour period. The double-amplitude (peak-to-peak displacement) was one inch and the frequency was 240 cycles per minute. The frequency was sufficient to allow the package to become completely airborne and enable a 1/16" piece of strapping material to be slid underneath the package during vibration.

Results:

After the tests, the wirebound boxes experienced no structural damage; there was no spillage of contents; the passing criteria was met.

b. Drop Test (178.603)

Procedure:

One of the packages that had been previously vibrated was reused for the five orientation drop tests: flat on the bottom, flat on the top, flat on the long side, flat on the short side, and on the corner. The height for all five drops was 4.0 ft (1.22 m).

Results:

There was no visible damage on the first four drops. On the fifth drop (on the corner), the impact corner received minor indentation. Also, minor cracks were observed on the top panel of the wirebound box. However, the container was in a sound condition. All contents remained inside the container and the package was capable of being handled without danger of spillage. The container exceeded the passing criteria of CFR 49 which required one new container to be subjected one drop only.

c. Stacking Test (178.606)

Procedure:

Two stacking tests were performed to obtain a confident result as follows:

1) The wirebound box that had been previously vibrated and dropped was reused

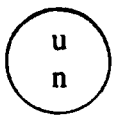
for this stacking test. A dead load of 1,756 lbs was applied to the top of the container for a 24 hour period. This simulated a stack height of 16 ft (13 layers) of identical packages.

2) A new wirebound box tested standing vertically per the configuration of palletization drawing 19-48-4116/43Q-20PA1002. A balanced weight of 506 lbs was placed on the end of the box that simulated a stacking height of 16 ft (four pallet layers) plus a 20% of safety factor. The test duration was extended to 48 hours.

Results:

During the tests, both the containers supported the load adequately. No structural damages were found on the containers after the tests. The passing criteria was exceeded.

5. Based on the above POP testing, the following POP symbol has been applied to wirebound box in accordance with drawing 12944155.



4C1/Y63/S/**
USA/DOD/AYD

** Insert the last two digits of year packed.